Journal of the Society of Arts.

FRIDAY, MARCH 22, 1867.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at Eight o'Clock:—

MARCH 27.—"On Flax, and Improved Machinery for its Preparation." By CHAS. F. T. YOUNG, Esq., C.E., Memb. Soc. Engineers, Assoc. Inst. N.A.

CANTOR LECTURES.

A Course of Lectures "On Music and Musical Instruments," by JOHN HULLAH, Esq., is now being delivered as follows:—

LECTURE IV.—MONDAY, MARCH 25.

MUSICAL NOTATION.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces—The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

LECTURE V.—MONDAY, APRIL 1.

MUSICAL INSTRUMENTS.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

LECTURE VI.—MONDAY, APRIL 8.

MUSICAL INSTRUMENTS (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

EXAMINATIONS, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanic, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

SUBSCRIPTIONS.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

FOOD COMMITTEE.

A meeting of the General Committee on the Food of the People was held on the 20th inst., at twelve o'clock. Present—The Right Hon. Henry Austin Bruce, M.P., in the chair; Mr. Harry Chester, Mr. C. Wren Hoskyns, Mr. Clare S. Read, M.P., Mr. McLagan, M.P., Mr. B. Shaw, Mr. F. Parish, Mr. Edward Wilson, Mr. James Ware, Mr. Sclater-Booth, M.P., and Mr. Ludford White.

The CHAIRMAN said, as business compelling him to leave London had prevented his attendance at some of the meetings of the Sub-Committees, he would ask Mr. Chester, who had been present at all of them, to report what had been done.

Mr. HARRY CHESTER—The Sub-committee on Meat has met repeatedly. We have had before us various suggestions, descriptions, and samples of methods of preserving meat. We have given particular attention to those which profess to aim at the introduction of additional supplies of animal food from beyond sea. A sample of beef salted at Buenos Ayres, on Mr. Morgan's plan, by injection, was free from all objection on the score of putridity, but was very salt and rather tasteless. The meat at present to be obtained in South America appears to be very inferior to English meat. A perusal of Latham's "States of the Rio de La Plata," published by Longmans, will explain the causes of the inferiority of their meat. The governments of these states are anxious to extend the manufacture and sale of preserved meat; but their energies should, in the first instance, be applied to the improvement of their agriculture, to the renovation of their impoverished pastures, to the improvement of the breeds of cattle and sheep, to their better management, and to more skilful butchering. The meat must be improved before it can come into successful competition with the meat of the United Kingdom or of Australia. These remarks do not apply to the manufacture *Extractum carnis* (Liebig) in South America, for there is no reason to suppose that the *Extractum carnis* sent from there to this country is inferior in quality to that manufactured elsewhere. The Committee have had before them various samples of *Extractum carnis* manufactured in South America, in Australia, and in this country. They are all stated to be made from the formula given to the world by Baron Liebig, and the Committee have no reason to suppose that one is much better than another. The Committee have carefully considered the various opinions which have been given respecting this kind of food. It is dried beef-tea, and the present scientific view appears to be that it is not an article on which alone life could be sustained, but is valuable under certain limited conditions. In the first place, it is very portable; and, in the second place, it will keep good for an almost unlimited period, and in any temperature. For the limited purposes which it subserves a very small quantity goes a great way. It contains none of the fibrin or albumen of meat, but then those necessary substances are intentionally eliminated by Liebig, as not capable of being preserved for any length of time, and it is stated that they may be conveniently substituted by vegetable fibrin and albumen. The addition of eggs, or of some ripened grain seeds, to *Extractum carnis* is said to supply the deficient ingredients, and *Extractum*

has been recommended as a convenient and economical substitute for the beefy element in gravy soup and gravies, which are commonly made from stock meat. It should be borne in mind that of every hundred pounds' weight of beef about 75 pounds' weight is nothing but water, and when from the remainder the weight of the bone has been deducted, the residuum which is capable of being assimilated is very small, and that part of the residuum which is neither albumen nor fibrin, though important in its effects, may be concentrated in a small gallipot. At any rate, *pro tanto*, the increasing sale of *Extractum carnis*, which may be obtained at almost any chemist's or Italian warehouseman's, as it comes from distant countries, is an addition to our supplies of meat. I may add that another preparation, Dr. Hassall's Flour of Meat, which appears also to have a considerable sale, is stated by that gentleman to contain albumen, fibrin, gelatine, and fat, which are wanting in the *Extractum carnis*. The Committee has every reason to believe that this also is a preparation of considerable value. Returning for a moment to Mr. Morgan's process of salting meat, I may say that the Committee has obtained from the Admiralty a return, giving the opinions expressed by the officers and crews of various vessels in the Royal Navy, who had tried the article. The letter from the Admiralty remarked that the unfavourable opinions preponderated; but weighing the opinions as well as counting them, and bearing in mind the prejudice likely to be entertained against a new article of diet, the Committee were by no means led to conclude that Mr. Morgan's process had been shown to be a failure. The Committee had before them a specimen of beef preserved in paraffine by Professor Redwood's process; but as this had had but scant justice done to it by the cook, they could not pronounce an opinion upon it. Messrs. McCall, of Houndsditch, exhibited a specimen of South American beef, which was preserved in November, 1865, by the process patented by Messrs. McCall and Sloper. This sample was quite free from putridity; but the Committee require further information before they can pronounce on its merits. They have also had before them several samples of preserved beef imported from Australia by Messrs. McCall. This is "Tindal's Australian boiled beef." Messrs. McCall have received the first consignment of 60,000 lbs. weight; and arrangements are made for similar arrivals monthly. It appears to be prime beef, not salted, free from bone, and cooked ready for table, and is sold at 7d. per pound, in six-pound tins. This is about equal in price to uncooked meat, with bone, at 5d. or 5¼d. per pound. It is therefore cheap as well as good; and, as the supply can be enlarged to almost any extent, it is an important addition to our markets, and may even affect their prices. The process by which the meat is preserved is an old one—hermetically sealing in tins. The Committee are not at present in a position to report fully respecting an invention which promises valuable results in the hands of Professor Gamgee. The Committee, and several scientific gentlemen, who attended by his invitation, were present on two occasions when bullocks and sheep were killed by a painless process, and their flesh was subjected to a preserving process invented by the Professor. Specimens of the meat thus treated have been sent to the tropical departments at Kew and the Crystal Palace; and it is proposed to send other specimens to Australia, and to South America, to ascertain whether it will stand the test of the outward and homeward voyages, with their extremes of temperature.

The Sub-Committee on milk has also had repeated meetings. On this head the most important questions affecting the supply of milk for the metropolis, and other large towns, appeared to be mainly questions of transit by railway. The Committee has obtained returns giving various particulars from the milk-carrying railway companies; but as those returns are at present incomplete, I cannot now state their effect. Mr. C. Alexander Wood, a director and vice-chairman of the Great Western Railway Company, has kindly attended the Sub-Committee, and had brought with him Mr. Nicholson, the company's superintendent of parcels at Paddington; and the information given by those gentlemen will shortly be published.

Lord de L'Isle, a member of the Committee, has procured for its information an account of the system of cotters' cowkeeping which prevails in the North of England, and is there valued as affording not merely pecuniary means of support to the cotter, but opportunities for the purchase of small quantities of milk by the poor, and also a useful training in cleanly, industrial habits for the wives and daughters of the cotter, who are thus enabled to learn to make butter and manage a dairy, accomplishments which are rarely found in the women of the south. This it is also intended to publish.

Baroness Leisner-Ebersberg, who stated that she had patented in this country, under authority from Baron Liebig, his invention of Food for Infants, which she called Liebig's "Concentrated Milk for Infants," forwarded to the sub-committee a sample, manufactured by Mr. Mullen, of Titchbourne-street, which was tasted by the committee and found palatable. It was stated in her communication that Baron Liebig declared this preparation to be the chemical equivalent of mother's milk, and therefore the best possible food for such infants as are necessarily brought up by hand. The term, "Concentrated milk," appears to be a misnomer. It is in fact cow's milk, to which a small quantity of potash and finely-ground malt has been added. The Baroness said that she was forming a charitable society for the gratuitous distribution of this milk to the poor. The Committee have had before them a French lactometer which is used by the police in Paris to test the purity of the milk sold there. It clearly shows whether the milk is diluted with water, and to what extent. A similar lactometer, or milk test, purchased for one shilling in London, was also tried and found to act with correctness.

The SECRETARY then read a letter, addressed to Mr. Harry Chester, by Professor John Gamgee, on the subject of the preventible diseases among the herds and flocks of this country. It was resolved that the letter be published in the Society's *Journal*, and that a copy of it be sent to the Home Office and to the Board of Trade, with the expression of the Committee's hope that the subject, which was of very great national importance, might receive attention from Her Majesty's Government.

A Sub-Committee, on "Cooking and Cooking Apparatus," was appointed. The Committee then adjourned.

CANTOR LECTURES.

"ON MUSIC AND MUSICAL INSTRUMENTS." By JOHN HULLAH, ESQ.

LECTURE III.—MONDAY, MARCH 18.

MUSICAL EXPRESSION.

In commencing his third lecture, Mr. Hullah said it was especially necessary, in the present instance, to define exactly the thing he was about to discuss, because the word "expression," in connection with music especially, was often used to represent that of which it was the mere vehicle, sentiment. As applied to musical performance, there might be some excuse for this confusion of terms, but as applied to musical composition there was none. Musical composition is expression; and it is the composer who expresses, while the performer simply presents the composer's expression. But before admitting the identity of musical expression with musical composition, we must be quite sure to what musical process the term composition can be applied. The conditions under which it is practised are peculiar.

Unlike any other artist, the musician requires long and special training before he learns how to realise the effect, in performance, of what he puts on paper. The musician must, so to speak, be able to hear with his eyes. An anecdote was given, related of himself by Rousseau, who, altogether ignorant of the effect of musical successions and combinations, had put on paper a Symphony the performance of which had been attended with the most disastrous results. Ignorance so absolute as Rousseau's was rare among would-be composers in modern times; but not so in ancient, even among trained musicians, and for a very simple reason; that composers, even down to the middle of the 16th century, had not ready access to those keyed instruments which present such a ready mode of testing musical effects. History shows that music has taken longer to attain excellence than any other of the fine arts. To a great extent this is attributable to the latter being revived arts; whereas music, in our acceptation of the term, is a new art. But its comparatively slow progress is due also to the difficulty which the earliest harmonists had in appreciating the effect of what they wrote. A fourteeth-century M.S., recently discovered at Montpellier, has been found to contain no less than three hundred and forty pieces of vocal music, in two, three, and four parts, by composers of the twelfth and thirteenth centuries. The melodies of many of these are very pleasing, but the harmonies are insupportable to a modern ear. In proof of this, Mr. Hullah played one of them, first without accompaniment and then with its contemporary harmony. Why was the harmony so inferior to the melody, both being of the same age and country?—Simply because the effect of melody could be ascertained in the very act of making it, while that of harmony, in these early times, had to be guessed at, or ascertained by processes too troublesome to be often brought into requisition. Moreover, musicians who wrote even as late as the end of the sixteenth century had other difficulties to contend with. Their *tonality* was different from ours and essentially empirical. Not that the old masters were altogether ignorant of modern tonality, but that they were very timid and slow in adopting it. The many changes in musical practice which were finally universally accepted only towards the end of the seventeenth century, turn, for the most part, on a more philosophical tonality. Everything that essentially distinguishes modern music from ancient is due to this. To the general acceptance of modern tonality we owe the distinguishing characteristics of modern music—*expression*,—that quality, in any given musical passage which, by whatever means, is able to put those who listen to it in a condition of mind accordant with, and like that of its author, at the moment of its conception. Till recent times, few essays in musical expression had been made save in vocal music, and these were much aided, as they had been dictated, by the words with which they were connected. Expression, by means of music pure and simple, is altogether a new art. The attention bestowed on musical expression during the 17th century is mainly due to the efforts of a body of amateurs living in Florence, who thought to remedy the shortcoming of the music of their own time by a revival of that of the Greeks. They neither succeeded in abolishing polyphonic music nor in recovering the music of the ancients, but they compelled musical composers to give more attention, as well to the general sentiment of the words they set, as to their particular emphasis and quality. Indeed, for a considerable time music was rather open to the reproach of *over*-expression than the reverse, and a style of composition became general in which notes waited on words with a pertinacity always servile and often ridiculous. The lecturer here gave a number of instances of this from composers of the 17th and 18th centuries. This kind of musical punning was advocated by many of the theorists of the time, among others by Christopher Sympson, in his "Compendium or Introduction to Practical Music." Contemporary composers certainly acted in the spirit of Sympson's instructions. Purcell has gone the length of imitating a drunkard, in musical notes, even to his stagger and hiccough; and his predecessor, Matthew Lock, has set the responses to the Commandments in ten different ways, each setting being, as he considered, characteristic of the Commandment which it followed. But mistakes in musical expression, or rather misapprehensions of the powers and uses of music, have been made by greater and more recent masters; for it is surely a mistake, and a misapprehension of the powers and uses of music, to deal with it as an imitative art. In the hands of a great master music is a suggestive art. When a musical passage is fairly performed, the sentiment of the composer will be communicated to the auditor, provided that it *be* a sentiment, not a circumstance, a material object, or a mere conceit. Their several musical expressions can be found for passions and feelings, but not for events, accidents, natural phenomena, &c., the representation of which in music generally proved impossible, and where not impossible, ludicrous. Mr. Hullah illustrated this by extracts from a work, Haydn's "Creation," on which, as a whole, he passed a warm eulogium, and related an anecdote of the great composer's failure in representing a storm at sea by pure musical sounds. After an account of some attempts at musical imitation, dating as far back as the beginning of the sixteenth century, the majority of which were purely vocal, the lecturer spoke of the purely instrumental attempts which had distinguished the end of the last and the beginning of the present centuries, when it reached its apogee of absurdity. He described a number of pianoforte pieces, commemorative and descriptive of the great events, especially the battles of land and sea, of that epoch. Most of these were *opera obscurorum virorum;* but some few were by musicians of considerable eminence,—among them, Steibelt and Dussek. A piece by the latter bore the title of "The Sufferings of the Queen of France: a musical composition expressing the feelings of the unfortunate Marie Antoinette, during her imprisonment, trial," &c. One only of this legion of descriptive pieces had escaped the well-deserved oblivion which had attended all the others, Kotzwara's "Battle of Prague," with which the present generation of pianists keep up at least a bowing acquaintance, and which was anything but unknown to the music-sellers. In conclusion, Mr. Hullah said that the only legitimate field for the exercise of musical imitation was comedy—he would almost say burlesque. The province of the musical art was, he repeated, suggestion, not representation; and every attempt at representation by means of musical sounds, whether of "moving accidents by flood or field," natural phenomena, or aught else, must, of necessity, fail—as was proved, if proof were wanting, by its always wanting commentary—notes explanatory of notes; and where such imitation was least imperfect it was, perhaps, most ridiculous. To define, even approximately, true musical expression would be a difficult task,—one, however, which all who studied music could at least partially perform for themselves. Innumerable examples of it were to be found in the best, and perhaps, on the whole, most familiar works of the great composers; those, especially, who have written since the beginning of the last century, who, unlike many of their immediate predecessors, had governed expression, not allowed expression to govern them, and had never forgotten that, without beauty of form, truth in art was incomplete.

FIFTEENTH ORDINARY MEETING.

Wednesday, March 20th, 1867; The Rt. Hon. STEPHEN CAVE, M.P., Vice-President of the Board of Trade, in the Chair.

The following candidates were proposed for election as members of the Society:—

Folliott, William, 12, Idmiston-villas, Forest-gate, S.E.
Lewis, R., 18, St. James's-street, S.W.
McCall, J., C.E., 137, Houndsditch, N.E.

The following candidates were balloted for, and duly elected members of the Society :—

Beaumont, Somerset, 144, Piccadilly, W.
Dunderdale, James, Tiverton-lodge, Cheetham-hill, Manchester.
Hopkin, W. K., 5, New Cavendish-street, W.
Hutchinson, Robert Hopwood, Tenter-house, Rochdale.
Karslake, Sir John B., M.P. (Solicitor-General), 50, Pall-mall, S.W.
Nield, Jonathan, Dunster-house, Rochdale.

The Paper read was—

SUCCESSFUL OYSTER CULTURE.

By HARRY LOBB, Esq.

The paper I shall have the honour of reading to you to-night is on the subject of "Successful Oyster Culture," and has been called forth by the dearth of oysters, and the consequent great increase in price of this favourite mollusc. The cause of this dearth is constantly being inquired for. Many reasons have been given, most of them erroneous; I will therefore endeavour to lay before you the true cause of the increase in the price of the oyster, and the way to reduce it to its normal figure, "fourpence a dozen, retail, for the best natives." You must excuse me if I do not refer to the ancient Britons or Romans, or any of the more remote oyster-culturists, as I shall hardly have time to consider more than the last ten years of the science.

The cause of the great price of oysters is their scarcity. The demand for oysters has increased with the population and the facilities for traffic;—the price has increased,—the dredgermen have increased in numbers, and, after having exhausted the home beds, they have done the same with the Scotch and Irish beds, until at length all the available oysters have been eaten up, and none left to re-stock the beds. This state of things is not peculiar to the British Isles; our neighbours found themselves in precisely the same condition about the same time. Singularly enough, the English, unlike their usual method of behaviour in case of difficulty, began to mourn over the loss, and to search for some cosmical cause for the *disease* ravaging their oyster beds. True there was a disease, bearing the fatal name Consumption! but this was not discovered at the time. The French, led by M. Coste, and under Imperial patronage, at once set about to remedy the evil. All my hearers are acquainted with the story of the mason of the Ile de Ré, M. Bœuf, who established the first artificial breeding bed; his success led to an immense industry, where some 2,000 proprietors of beds raised some hundreds of millions of oysters; but as I do not consider the Ile de Ré system adapted to our shores, I pass it over, merely recording the fact, as the first success, and the origin of all future attempts. Let me, however, chronicle a few statistics of the Rivedoux beds, premising that the labour bestowed is not hired, but simply that of the proprietors and their families, at such times as they can spare from their other avocations. The following is the result of the sale of oysters from the beds of Rivedoux, about a mile in length, by 150 yards in width:—From 1859 to 1860, £126; 1860 to 1861, £320; 1861 to 1862, £1,520; and from 1862 to 1863, upwards of £2,000.

M. Coste now took the matter up in a scientific spirit, and having been informed of the complete denudation of oysters of the bason of Arcachon, he turned his attention to this spot. The bason of Arcachon, situated near Bordeaux, is a land-locked indentation of the Bay of Biscay, a narrow channel, admitting the tide. It is a very large area, of almost pure sea-water, two small rivers, the Leyre and the Teste, emptying themselves into it. There is one island, and at low-water very extensive banks are exposed, but at low spring tides there are 2,000 acres laid bare, and between these, deep channels draw off the water from the banks. It was these 2,000 acres M. Coste considered best adapted for his experiments, for being exposed for two hours twice a day during low spring tides, it afforded this time for working the beds, and yet the oysters were covered at all other times. After a month's study, M. Coste made his report, in which he speaks of the bason of Arcachon as "a veritable mine of wealth, which, by judicious cultivation, might be made to yield from its 2,000 acres of bottom, uncovered only at low spring tides, an annual revenue of £600,000." There being no oysters left in the bason for breeding purposes, others had to be brought, and artificial means taken to attract the spawn when given off. M. Coste established two beds, but one, since established, having been more successful, I will give its history. The following is from a report I drew up for the directors of the South of England Oyster Company, on my return from Arcachon last July:—

The bed which has yielded the greatest results is that of Lahillon, created by M. Chaumel, commandant of the brig *Leger*, the government guard-ship in the bason. In the year 1860, M. Chaumel was directed by the Minister of Marine to carry out M. Coste's recommendations as to oyster culture, and to report at regular intervals upon the results effected.

Lahillon is a long strip of sea bottom, 2,700 metres long by 180 broad, and only uncovered for two hours twice a day at low spring tide; it is situated in the middle of a broad channel, bordering the north-east coast of the Ile des Oiseaux. A strong current runs over this bank; this bed lies in the centre of the channel, washing the beds established by M. Coste. M. Chaumel considered this a favourable spot for his attempt, and, consequently, 100 acres of this bottom were thoroughly dredged by the men of the *Leger;* not an oyster was found, on account of the ravages of the whelk, and not a trace of spat; the bottom, which was covered with mud and weeds, was entirely removed to about 18 inches in depth, and the natural sandy bottom of the basin, mixed with shells, was arrived at; this was well covered with all kinds of shells, of which there are immense quantities, principally cockles and oysters. In June, 7,500 tiles were placed, arranged in 270 piles, termed *ruches*, so that the water could circulate freely through them; these tiles are about three feet long by about five inches broad, and are curved, forming about the third of an arc of a circle; they are not glazed, but are more vitrified and less porous than our common English tile; they are rough, and admirably adapted for the purpose for which they are required. They are piled at intervals on each side of a central path, running along the centre of the bed, about 30 to each pile, and rise about two feet from the ground, forming an oblong mass, about the size and shape of an ordinary clothes box. These 100 acres are divided into compartments, first into two, by a long walk lengthways, then smaller paths two feet wide running at right angles to this, and separated from each other by a distance of six feet; four of these divisions form a bed, and each bears a number upon a pole some seven feet high. The usual custom of the oyster-breeders in Arcachon is to lay down the tiles in April and May, when the oysters begin to sicken, but M. Chaumel says that in this case they frequently get covered with weed and mud, whereas he is himself accustomed to lay down his tiles in June and July, when the young oysters are ready to attach themselves, and finding a clean surface favourable to them they readily fix themselves to the tiles.

Upon the bed Lahillon a *ponton* (large boat) is moored in which four men live; they watch the parc, and are constantly at work when the tide serves for their labour; besides these the sailors from the pinnace work at low spring tides for two hours twice a day. Upon the beds, 400,000 full-grown oysters from the adjacent parcs

were laid down, and 400,000 more sea oysters from the Ile de Ré; these oysters, during the following months of June, July, August, September, October, and November, emitted spawn, and the spat adhered to the tiles, shells, and every salient spot. The oysters emit spawn at different times during the aforesaid months, according to their nature and their state of health. The July spat is the largest. My visit to the bed took place upon the 10th of July, and M. Chaumel pointed out to me upon the tiles, oysters about the size of the surface of a split pea, which he said were 20 days old, that is to say had been attached 20 days; he did not reckon the time they had been free, which time is not at all accurately known.

The expense of making the Bed Lahillon was £1,140. The results of the experiment and the returns are as follows, not counting the present season, of which no return has yet been computed:—

Young oysters on tiles	1,255,248
Young oysters attached to parents ..	2,680,000
Young oysters on cultch fascines, &c.	1,246,014
Total	5,181,262
Returns from the sale of oysters	£8,000
Deduct expenses	1,140
Profit realised	£6,860

Besides the above, there remain upon the bed some 15,000,000 not yet fit for market, and of which the value has not yet been computed.

Of the oysters, great numbers are destroyed by the vermin, by the cold, by hail, by the sun, and other causes; in fact, M. Chaumel informed me he considered he lost a quarter of his oysters from these causes; the most destructive of the vermin is the *bigorneau* dog whelk, or piercer; these creatures appear in vast numbers in the spring; they are hatched out from nests, each nest containing about 800 eggs, and each egg 40 individuals; they pierce the shell of the oyster with an organ adapted for the purpose, and the crabs follow in their wake, and soon clean out the dead oyster; one of the duties of the guards is at low spring tides to collect the whelks upon the bed, and one man has been known to pick up 14,600 in the two hours of the low tide.

At the end of the breeding bed, the tiles are laid down, covered with the result of last year's spat; there are from 200 to 300 upon each tile, and they are as close as they can be crowded; attached by their hinges to the tile, with their shells opening outwards, these oysters are exposed to the sun, and are entirely uncovered for two hours twice a day, during low springs, without apparent harm. Upon the bottom of the beds, where the parent oysters are placed, each one is covered with a crop of young, some twelve months old, and they form such a mass upon the shell of the parent, that the old oyster in some instances can hardly be distinguished, and some specimens are the size of a child's head.

All these young oysters are separated from the tiles and from their parents at the end of September and during the following months, and are laid in beds of sand and mud to fatten; they are fit for market at the end of the following September, and during that winter, the largest, of course, being first chosen; so that the oysters from the bason of Arcachon are fit to be eaten when they are 27 months' old; this is at least a year earlier than an English-bred oyster is fit to eat.

A strong westerly gale at spring tide, so as to fill the bason, and then the wind falling, so as to cause a great scour, is considered very favourable for the attachment of the spat; in fact there is no doubt that the great secret for a successful spat is extreme cleanliness. The temperature of the water in the bason of Arcachon is extremely uniform, night and day it varies but little; the nights are mild, and the water in the Bay of Biscay being fed by the Gulf Stream, the temperature is constantly warm. M. Chaumel told me that the average summer temperature is 15° centigrade, and winter 5°. It never freezes at Arcachon, but the hail is sometimes very injurious to the young oysters.

The success obtained by the French naturally excited the desire of those interested in oyster culture in England to effect a like result; from what cause it were invidious to say; this was not done until a fitting site was selected, namely, the Island of Hayling. Here, however, we have almost similar conditions to those found at Arcachon; and no small credit is due to Mr. Hart for the acumen shown by him in his choice of this site. I suppose, if the whole sea-board of England were searched for a site for the cultivation of oysters, none could be found more suitable for the purpose of a breeding bed than the indentation on the east side of Hayling. Here we find an area of about 150 acres, covered at high tide by pure sea-water; a short embankment across the narrow neck would enclose this, and on the water being kept out a short time, the bottom would harden, and would work up into embankments by shingling the surface, and providing proper collectors. A breeding bed, sufficient to produce annually 500,000,000 young oysters, could be prepared in a few months. Mr. Hart, however, profiting by the formation of the Hayling railway embankment, considering that this—enclosing a large area of mud lands—would be the more eligible position, selected the western shore for his works. But before proceeding further, I will say a few words descriptive of Hayling and its fishery.

Hayling island lies at the mouth of a large area of sea water, which runs in from the Solent by two narrow channels on either side of the island, resembling in many respects the bason of Arcachon. The bottom at Hayling is chalk and flint; at Arcachon, sand; otherwise, the mud, the water, the weed, the channels, the mud banks, the protected site, the freedom from storms, from rough seas, from fresh water, are remarkably similar in the two localities. There are 10,000 square acres available for oyster culture; of these only the channels, up to the time of the South of England Oyster Company commencing proceedings, were worked.

The following is a brief history of the Hayling Oyster Fishery:—"In the reign of Henry II. the Emsworth fishery was valued at eight shillings and eight pence per annum to the royal treasury, and the harbour was from a very early date celebrated for the quality of its oysters, which are larger than the Thames natives, but considerably smaller than the Channel oysters. The local fishermen have ever looked upon strangers dredging in the harbours with jealousy, and have done all in their power to prevent it, although they themselves are not as a rule so provident as the deep-sea fishermen, who save their earnings to purchase vessels of larger tonnage and improved build. The harbour fishermen are satisfied to go on in the old routine, and seldom very much improve their position. Formerly the dredgers returned to the sea the young oyster and spat, reserving only the marketable oysters, but after a time they carried away with them all they removed with the dredge, retaining the small oysters to deposit in their own layings. The local men now believed that they were ruined, as the natural beds in the channel were rapidly being rendered barren, and as the demand for oyster beds increased, the lords of manors granted portions of mudlands to persons who cleared them, converting them into layings, and, according to the statute, planted sticks upon their boundaries, so that strangers should not dredge on their private beds. In these beds not only native oysters but Channel oysters were placed for fattening, for sale in the London market. This new system, however, did not suit the Emsworth fishermen, who, enraged at seeing the success of the new system and the destruction of the natural beds, determined to seize the oysters and destroy the artificial beds. They therefore combined amongst themselves, and commenced by attacking the oyster

beds belonging to the Messrs. Russell, in Crastick Lake; this resulted in some fighting, and at the assizes the fishermen at length discovered that they were not allowed to rob other people with impunity. The large dredgers still continue to move all they can get, and, according to some authorities, the dredging so disturbs and scarifies the bottoms and sides of the channels that the multiplication of the oysters is much increased, the spat is moved and distributed, and every year the number obtained increases. The artificial oyster beds contribute to this result, as the spat travels down the channels with the ebb tide, and by this means the area covered by spat is increased; every year we find the number of boats employed in this trade increase. The trade was formerly confined to the winter months, but now it is carried almost through the year. Oysters are obtained from all quarters, and laid in the beds for fattening, and the demand being so large and regular the trade is very remunerative. The best interest of the locality is to encourage this industry, which brings capital and labour into the neighbourhood, and must be of the utmost advantage to all concerned."

This account of the fishery was written some years ago, and very faithfully records its condition at the time; but since then the demand for oysters has considerably increased, and the dredgermen, acting upon the French proverb, "After me the deluge," have every year advanced in their depredations, removing oysters, ware, and spat—the former for market, the latter to lay in their own private beds. Formerly the dredging was continued during the whole open time, so that the bottom was kept clean for the spatting, but as the dredgermen increased in numbers—coming as they did from Whitstable and the Essex rivers, besides the local men—the oysters were removed in less time, therefore the bottom got more foul every year; and one week, in September, 1865, was sufficient to clear away all that was worth taking by the foreign dredgermen; and they all state that there was no trace of spat on account of the foulness of the ground. Thus it may be considered that the old-established Emsworth fishery is destroyed, and unless it becomes worth the while of companies, or private individuals, to cultivate these unproductive bottoms, it will never become re-established by natural means.

The South of England Oyster Company was instituted October, 1865, for the purpose of utilising the portion of mudlands inclosed by the Hayling Railway on the west coast of the island; forty-eight acres are now prepared, but it was found impossible to have the beds ready for the spat of 1866, and only one acre in a pond of four acres was thoroughly shingled and cultched, and eighty large hurdles fixed above the oysters laid down for breeding. On the 14th of June these oysters were observed to be what is termed "sick," and emitting the spawn; on the 15th of July the whole of the under-surface of the hurdles was so thickly covered with minute oysters, as to almost completely hide the bark. The acre of shingle and cultch is also covered with young oysters. The dead reeds and roots of grass bordering the pond, pieces of wood floating on the waters—in fact, every available attachment is thickly covered. This proves how thoroughly adapted the waters and temperature of Hayling are for the breeding of oysters.

It is necessary to understand something of the natural history of the oyster, so as to assist by artificial means the attachment of the spat. The young oysters are emitted from the parent in large numbers, forming a small cloud; each one is separate and independent, and they are not contained in any mucus; each oyster is protected by its shells, which it has the power of closing; beyond the edge of its shell it protrudes what has been termed its swimming pad, a double row of very long cilia, with which it is enabled to swim about in any direction; its usual position is with its swimming pad directed upwards, the hinge of the shell downwards, and its chief motion is upwards and downwards; upon any unexpected motion of the water, it withdraws its cilia, closes the shell, and sinks to the bottom. To the left of the swimming pad is an opening, fringed with cilia, leading to the intestinal tube. The young oysters are fond of attaching themselves together in rows of five or six, or more—the swimming pad of the second to the hinge of the first, and so on—still rapidly swimming. How long this peripatetic condition lasts I do not know; I have had them in a common phial fourteen days, during which time they showed no inclination to attach themselves.

When they do fix themselves, they do so very firmly, by the whole surface of the flat shell, and they cannot be removed without destroying the shell. At Hayling they prefer the clean bark of hurdles, wood, shingle, pieces of slate, &c. At Arcachon they prefer tiles, the external shell of parent oysters, &c. They select dark objects in preference to those of a lighter colour, and always attach themselves to the sides removed from the light; although guided by some law, they appear to be most capricious in the positions selected for attachment.

To show how hardy the spawn of the oyster is, and through what vicissitudes it will pass without injury, I have brought up from Hayling a specimen on the tile. On the 14th of June the oysters in the pond were found to be sick, and emitting spawn; on the 15th of July the spat was discovered attached to the hurdles placed for its reception, therefore during those 31 days the young oysters were free, swimming about the pond; on the east side of the pond is an adit, some hundred yards long; a windmill pumps water from this adit to a large wooden tank, from which the water is constantly running through a series of slate troughs, and from them to two wooden reservoirs; the overflow then runs into the lobster ponds; in these lobster ponds two or three large broken chimney pots were placed, as cover for the lobsters. Upon the inside of one of these pots I broke away this specimen of spat, which, you see, is $1\frac{3}{4}$ inches across the long diameter, by $1\frac{3}{8}$ inches the shorter; on comparing it with the spat on the hurdles, it will be seen to be at least four times the size of the average, the reason being that this one, being by itself, has had all the advantage of the nutritious matter surrounding it, whereas those on the hurdles had to share with their neighbours.

This oyster, whilst in its free condition, and in size almost microscopical, travelled down the hundred yards of adit, was pumped up by the windmill into the tank; here tens of thousands of its fellows were satisfied with their journeying, and attached themselves to the sides and bottom of the tank, this one went on, passed through a long leaden pipe, swam down the six slate troughs, leaving behind some hundreds to attach themselves to the slate, through the two wooden reservoirs, then down an underground drain-pipe, into the lobster pond; here, satisfied with its travels, it attached itself to the inside of the chimney-pot, and flourished, and is the largest specimen I could find.

The young spawn avoid the light; they always attach themselves, where practicable, to the under side of objects. For instance, the hurdles were only covered on the under surface; they swarm under stones to fix to. They are found in large numbers in the holes and cracks of banks. When there are proper materials for attachment they always prefer dark substances, such as slate, or blackstones; the dark in preference to the white wood. I do not think there is an exception to this rule. Again, they like quiet water and warmth, but not the direct rays of the sun; cold rains and hail are very destructive to the young brood. An even temperature, averaging about 62° Fahrenheit, day and night, is that most conducive to the security of the spat.

And now let us glance somewhat cursorily at the late attempts at legislation, for the purpose of arresting the wholesale destruction of the oyster beds. A commission sat for the purpose of studying this question, and, deceived

by the evidence given, most of it being mere guess work, the commissioners issued a report, which I believe to have been the cause of much injury to natural beds. Upon this report the late Government, recognising the necessity for legislation, introduced a Bill, intituled, "An act to facilitate the establishment and improvement and maintenance of oyster and mussel fisheries in Great Britain." The bill was the offspring of the Board of Trade, and was fathered by the then president, Mr. Milner Gibson. Before the third reading, the Conservatives came into office, and Mr. Stephen Cave, whom I am happy to see in the chair this evening, became its step-father. Under its provisions applications were invited by the board, but the act being very vague, and the board wanting information, the first batch of memorials were refused without inquiry. These, however, afforded them information, and they issued a set of regulations, which facilitated matters so far as to point out what they will grant and what they will not.

"I.—*General Principles on which exclusive Rights of "Fishery will be granted.*

"The following comprise the several classes of grants or concessions which appear to the Board of Trade to fall within the scope and intention of the above-named Act, and for which they will be prepared to receive applications:—

"1. Appropriations of moderate areas of unproductive sea-bed or foreshore for the establishment of new fisheries or local depôts.

"2. Appropriations of small areas of already productive ground for oyster layings or depôts in the vicinity of public beds.

"3. Concessions of exclusive fishery rights to owners or occupiers of existing fisheries, but within such limits and conditions only as may make such concessions beneficial to the public.

"Claims for grants coming under any of the following heads cannot, with a due regard to the public advantage, be entertained:—

"1. Appropriations of large areas of already existing public beds or productive dredging ground.

"2. Appropriations of larger extents of ground than the claimants have the means of beneficially cultivating, —whether under the plea of regulating and superintending the fishery, or for any other purpose.

"3. Grants of licensing or sub-letting powers.

"The only ground for appropriating or granting exclusive fishery rights over any portion of the seashore is the expectation that by these means the supply of oysters will be materially increased, and the public thereby benefited. Such expectation must consequently be shown to exist in all cases of grants under this Act, and especially in the case of a grant of already productive dredging ground."

The Board of Trade appear to reason thus: "If the ground is, or has been prolific, we will leave it to the dredgermen to work; but, if any company or capitalist come forward, we will only grant them an unproductive sea bottom, which, should they succeed in making valuable, will be to the public advantage, and will interfere with no vested rights." This is true enough. But what man would be so simple as to invest money to work a sea bottom proved to be unadapted to the purpose? Nature has already pointed out all the situations adapted for oyster culture, by sowing seed everywhere, and, as the seed is in such immense quantities, and free to choose its site for attachment, what with the currents, winds, and other causes, every place adapted for the purpose has been already discovered by the unerring instinct of nature. Almost all the natural breeding beds have been exhausted by reckless dredging. Many of these are now useless, from the cessation of dredging and the consequent accumulation of sludge and vermin; and, even should spawn visit these beds again, there would be no spat, as there would be no clean cultch to offer attachment for the spawn.

Reckless dredging must not be confounded with constant dredging. The former is the result of the selfish policy of taking everything that can be obtained from the natural beds—in fact, destroying them—and is what has been done now for many years, chiefly by the Whitstable men, who seek out every natural bed, wherever it may be, and do not leave it till it is dredged bare. They also encourage others in the same policy, by purchasing everything of the nature of an oyster that may be brought to them. These men, in their corporate capacity, are also examples of the second form of dredging; for they work their beds all the year round, thus keeping them fresh and clean; they move their oysters, destroy vermin, remove weed, in fact, take the greatest care of their growing and fattening beds, consequently turning out a very fine oyster, fetching the highest price in the market, at present £6 the bushel, or 1s. 8d. a dozen retail.

The Board of Trade having taken upon itself the responsibility of legislation to facilitate the formation of private beds, to increase the supply, and, consequently, lower the price of oysters, the public are somewhat disappointed to find that, up to the present time, nothing has been done, and the price of oysters is steadily increasing. It is hoped that this session may not be allowed to pass without some orders under the Act being granted.

The facilities desired by companies and capitalists are something of this nature:—

1. Upon clear proof that hitherto productive areas of sea-bed or foreshore have been rendered unprolific, and that the local or other dredgermen have ceased to work the ground; that exclusive rights of fishery be granted over such areas to fitting applicants.

2. That foreshores, beds of rivers, lakes in harbours, &c., adapted for fattening purposes, shall be granted to applicants upon payment of reasonable royalty to the crown, corporations, lords of manors, &c., who may be proved proprietors of such foreshores, river beds, &c.

Allow me, in conclusion, to recapitulate the principal points in my paper, as follows:—

The cause of the increase in the price of oysters is, their scarcity.

The cause of the scarcity of oysters is, many years of reckless dredging.

The result of the many years of reckless dredging is, the destruction of the natural oyster beds.

The remedy is, the establishment of private breeding beds and the renovation of the natural beds by judicious legislation.

DISCUSSION.

Mr. CHOLMONDELEY PENNELL would be glad to have a little more information with regard to the success already achieved at the oyster grounds at Hayling, and as to the future results which were anticipated from them in a commercial point of view. He understood that a large portion of the ground had been cultivated, but would not produce a crop this year. He would observe, with reference to the recent Act of Parliament referred to by Mr. Lobb, that he thought that gentleman took a rather erroneous view of the intention and effect of the regulations by which the Board of Trade proposed to carry out that Act. The Board of Trade having done him the honour to refer to him occasionally in the administration of that Act, perhaps he might venture to say a few words upon the subject. In the first place, he thought it was a misconception to suppose that when Parliament passed that Act they had the intention of making it practically amount to a confiscation of the existing fisheries of the kingdom. Of course where a large public fishery existed, private individuals or associations would be glad if they could readily obtain exclusive possession of it. An oyster fishery was a valuable thing, but it was by no means clear to him how such an appropriation would benefit the public, unless

it could be shown that it would result in an increased supply of oysters. Whether the fishery were worked by a corporation, by private individuals, or by a company, this was the only question to be considered. The object of the Act, as he understood it, was more particularly to promote the creation of new fisheries in this country. As Mr. Lobb had stated, a portion of the coast off Hayling Island was admirably adapted for the cultivation of oysters on the French system. He understood that that was a private undertaking, and required no parliamentary sanction; but supposing it had been public ground, he thought that would have been a proper opportunity for applying the provisions of the Act, so that those who undertook to cultivate that oyster ground might have security in the property they created. With regard to the alleged excessive stringency of the regulations, at all events this had not deterred persons from making applications under the Act, because a number of them had been made, and he hoped it would be found consistent with the public advantage to grant some of them. The administration of that Act had been conferred upon a Board whose liberality and courtesy in dealing with all sorts of commercial matters which came before them was notorious, and one great advantage which oyster cultivation would receive from the new Act was, that the management of the foreshores was transferred from the Woods and Forests to the Board of Trade. That Board had already evidenced its intention of exercising the powers granted by the Act in a liberal spirit, and there was reason to believe it would eventually be a great success. He hoped it would ultimately lead to a great diminution in the price of oysters, for that was the practical point which they all wished to arrive at.

Mr. LOBB said, with regard to the success of the Hayling oyster grounds, the idea was originally to commence operations with a large area of forty or fifty acres, but it was found if the company did that they would waste a year; therefore, some saltings near the beds were purchased, and they commenced at once with a pond of four acres and the adjacent saltings of eight acres; but of the pond of four acres there was only time to get one acre ready, as the bottom was muddy and had to be made firm. First of all sand was thrown over it, then about eighteen inches' depth of shingle, and then, about two feet from the bottom, a series of hurdles were placed; the oysters were laid upon the shingle bottom. On the 14th of June they showed signs of becoming "sick," and on the 15th July following the whole of the under surfaces of the hurdles were covered as thickly as they could be with spat. As he had stated, only one acre out of the four had been as yet cultivated; the remainder was still muddy, and if the spat fell upon the mud it was choked, but he did not suppose any of the spat had fallen upon the mud, because it naturally sought the shingle and hurdles. The value of the spat thus deposited had been variously estimated at from £2,000 to £12,000. The value put upon it by the company was the former sum, but when the oysters were sold next September twelvemonths the real value would be ascertained. The area which would be prepared ready to receive the next spat was about 35 acres, and if the success on that more extended scale was as great as it had been last year on the single acre, the company would have every reason to be satisfied. With regard to the relative temperature of the water at Hayling and Arcachon, no doubt at the latter place it was higher. The average temperature at Hayling in summer was, in the day-time—maximum, 67° Fahr.; minimum, 50°; mean, 62½°. With this steady temperature, there could be no doubt of the success of the operation. Hayling was very warm; it was much protected; the Isle of Wight lay in front of it; it was free from stormy weather; indeed, there was nothing at all inimical to oyster culture. With respect to the administration of the Act of Parliament by the Board of Trade, he hoped the remarks he had made on this subject would not be considered out of place, but he had no idea, when he undertook to write the paper, that so eminent a man as Mr. Cave would occupy the chair; the chairman, however, would be able to correct him, if he had been in error. The memorials for the establishment of oyster fisheries forwarded to the Board of Trade had hitherto been unsuccessful. There were three or four more about to be sent in, and he hoped these would be more fortunate. The Blackwater fishery was an instance in which he thought much good might be done by the interference of the Board. It was 15 miles in length, and, at present, was almost entirely destroyed by reckless over-dredging. What he wanted was that these grounds should be handed over to people who would take care of them, and protect them from over-dredging, so as to greatly increase the produce, and thus benefit the public. The Whitstable bed was a magnificent one, worth many thousands a-year, because it was protected; but if this had been allowed to be over-dredged, as had been the case in other instances, there would have been scarcely an oyster left, or any spat remaining. It had been the same both in France and in England, wherever a natural bed of oysters was discovered, it was dredged bare. The whole of the Solent, one of the most magnificent beds in the kingdom, was now a mass of sludge. It had been dredged till there was not an oyster left, except in one place, where the rush of water was so great that it kept the bottom clean, but all the other beds were one mass of sludge. It was the same with the Emsworth fisheries; there was no trace of spat there this year, and every oyster was removed in a week or two which ought to have afforded several months of dredging.

The CHAIRMAN said there were certain points in Mr. Lobb's able and interesting paper from which he disagreed to a certain extent, but these were matters of detail rather than of principle. He thought the general result of Mr. Lobb's statements had been to show that, on principle and on general grounds, the action of the Government had been entirely right in this matter. Mr. Lobb stated that the Commission which sat on this question was deceived by the evidence given being mere guess-work; but those Commissioners conducted their investigations for more than two years, and when he mentioned the name of Professor Huxley as one of them, it was a sufficient guarantee that great care and scientific knowledge were exercised in the investigation. He might say, having been the president of a commission which went to France last winter to negociate a Fishing Convention with the French Government, he found that the report of the commission which Mr. Lobb had spoken of and the whole of the evidence had been translated into French, and was considered in France to be a very valuable document. It was not correct to say that he (the Chairman) was the stepfather of Mr. Milner Gibson's Bill, and that he took it up on the third reading. The fact was, the Bill had been read a second time only, and he introduced several alterations in committee before the Bill passed the House, and he thought some of them would go far to accomplish what Mr. Lobb had expressed in his paper. The Act itself, Mr. Lobb said, was very vague, but Acts of Parliament were generally very vague. They laid down certain principles; it was impossible to go accurately into details. It was not correct to say that the first batch of memorials under this Act were refused without inquiry. Those memorials came before him, and great inquiry was made upon them. No doubt Government was anxious before coming to a decision to settle some definite rules on which to act, and it was no great blame to the Government if they sought for further information before taking action in a matter which was quite new, for the Act was only passed in July last year. As we were only now in March of the following year he did not think any extreme delay had taken place. He saw in a little book, written by the author of the paper,

it was stated in the preface that it would probably take twenty years to effect the objects he had in view. If that was so—aud probably Mr. Lobb was right—he (the Chairman) did not think the few months that had elapsed since the passing of the Act should be regarded as waste of time in proceeding cautiously before granting the applications that had been made under this Act. They must know in the first place that the Crown rights upon the foreshores of the sea or tidal waters between high and low water marks, which had been under the administration of the Office of Woods and Forests, had been lately transferred to the Board of Trade; but the ownership of the Crown must be regarded as a mere trusteeship for the public. The Crown should protect the rights of the public in them, and if it granted them exclusively for certain terms of years to particular persons applying for them, this must be done in the interests of the public. There were certain applications which Mr. Lobb had specially referred to—viz., for the Blackwater and the Solent. Both these were very large areas, and those gentlemen who applied for the Solent wished to have the entire control over that large sea, not only for the cultivation of oysters themselves, but to give licenses to other people to cultivate them; or, if they thought it necessary, to shut up the fishery altogether for two years, much as the Dutch used to burn nutmegs to prevent them becoming too cheap. These applications were naturally refused, because the areas were too large. The object of the Act was to do as far as possible what the French had done on their coasts. What the French desired was, not to bring large companies to bear upon these great areas, but to bring individual enterprise, or small associations of men to bear upon them. It was considered that there was a dog-in-the-manger feeling on the part of large companies. They collected all they could gather for themselves and wished to keep out all others. He spoke on this subject generally: he had not any individual case on his mind. In the interest of the public no doubt small areas should be given. The French granted very small allotments, and the Minister of Marine informed him that his view was to let every individual have his own private oyster park, as it was thought under that system the culture would be carried out more satisfactorily than if the trade was monopolised by large companies. He thought Mr. Lobb had misunderstood the first clause of the general principles which he had quoted, which stated the concessions under the Act to be "Appropriations of moderate areas of unprotected sea-bed, or foreshore, for the establishment of new fisheries or local depots." Mr. Lobb thought very naturally that nobody would be likely to cultivate anything which was quite certain to produce nothing. It would not be common sense to do so; but in this case he (the Chairman) thought the word "unproductive" meant what was not *now* producing anything, and as a sort of defence of this expression he would quote the words of the paper with regard to the Emsworth fishery, in which Mr. Lobb said, "Unless it becomes worth the while of companies or private individuals to cultivate these 'unproductive' bottoms, it will never become re-established." What Mr. Lobb there meant by the word "unproductive" was precisely what the Government meant by it in these general rules. It simply meant that which was not now producing anything, either because it had been over-dredged and destroyed, or because it had never been tried. Mr. Lobb had shown that there were parts of the coast which were considered hopeless for the cultivation of oysters, because there was nothing naturally for the spat to take hold of, but he had shown them to-night that if they laid down tiles or hurdles they enabled the spat to take hold. That was exactly the point the Government took. On the north-west coast of England there were, long before this Act was passed, artificial oyster fisheries, which failed for want of protection by law. This was sought to be remedied by the Act of last session; and the Bill now before the House of Lords gave the same protection from depredations in the case of oyster beds as was now afforded by the game laws in the case of game on an estate. In former days, if they caught a man "red-handed" taking oysters from a bed, they could punish him for the theft; but, if he was five yards away from the bed, they could not ask him where he got the oysters, any more than, under the old game laws, they could demand that a man should account for the possession of any pheasants or partridges found upon him. Therefore, it was clear that being the state of the law, there was little inducement for persons to spend money to form these oyster beds, because there was no legal protection to the property. In this respect the Act of last session was not entirely satisfactory, inasmuch as, while it protected the fisheries formed under that Act, it left those which were formed before the passing of the Act without this remedy, and he thought the Hayling Company complained of this very justly; and, though he (the chairman) did not see his way, at the time Mr. Lobb spoke to him on the subject, to remedy the defect, he had seen it since, and he hoped he had now done it effectually. As to the general question, what was the object of this legislation, he was aware it was popularly considered better to leave everything free—that fish should be left free to those who could catch them, the supply being practically inexhaustible; but the case of oysters was no doubt different. Mr. Lobb had stated very truly that the oyster beds on our coasts had been overdredged. But what was the reason? Simply because the demand for oysters was much greater than it used to be. Persons of his own age recollected the time when barrels of oysters were sent from London by the coaches into the principal towns; but now every little town got its supply of oysters fresh by railway, and the consumption of them was enormous. We might have prevented the over-dredging in the same way as the French had done, but we must recollect the difference between a paternal government and our own. It was, moreover, remarkable that though the French had been very strict in their fishery laws, while we have been rather lax, notwithstanding this, the price of oysters in Paris was higher than in London. The only way in which we could stop over-dredging in the public beds was by a strict enforcement of the fence-months; but if there were considerably too many dredgers during the open months of the year, the beds were dredged bare. What was the remedy for this? Mr. Lobb had pointed to it in his little book, in which he laid it down as an axiom that the natural oyster beds of the United Kingdom were nearly exhausted, and thus "private breeding beds have become an actual necessity." That was the whole case. Mr. Lobb and himself were entirely agreed on this point—that we could not rely on the public beds any longer, but we must come to the private beds, and that every possible facility ought to be given for the formation of such beds. At the same time it must be recollected that there are public beds, and we must respect public rights. It might do for a paternal Government, like that of France, to say they would take upon themselves to do what they considered best for the public generally; but in legislation we could not always do that, and must often respect existing rights however absurdly they operate. In the case of the Blackwater there had always been a public trade, and the fishermen had been in the habit of dredging it year after year; but if Government were at once to divide the whole of the Blackwater amongst different companies a considerable amount of public discontent would be caused. Therefore, in a case of this kind, as in many others, legislation must be based upon compromise. They must take public opinion with them, and must feel their way to every step before they took it, particularly in so delicate a matter as this. He had detained the meeting for a considerable time, but, holding the position he did, he thought it proper he should explain as carefully as he could the points on which legislation

on this subject had been based. He had probably eaten oysters in as many parts of the world as most people. He had eaten those which hung on trees in South America; he had also eaten the enormous oysters of North America, two or three of which were sufficient to make a great dish of soup; he had also eaten the classic oysters of Baiæ, near Naples; and the green oysters of Ostend and other places; but he must say, in all his experience, he had found none equal to what were known as "natives" in this country; and his own personal feeling, as well as the interests of the public, would lead him to desire to increase as much as possible the supply of so highly valuable and popular an article of food. He would now propose a hearty vote of thanks to Mr. Lobb for his most interesting paper. He felt personally obliged to that gentleman for the remarks he had made upon legislation, because they had given him an opportunity of explaining, as clearly as he could, and without the slightest desire to say a word against what Mr. Lobb had written, the objects and purposes of recent legislation, as bearing upon this subject.

The vote of thanks was then passed, and acknowledged by Mr. Lobb.

Proceedings of Institutions.

SHERWOOD MUTUAL IMPROVEMENT SOCIETY, BATTERSEA.—The last report says that the number of members has greatly increased during the year. The course of fifteen lectures which have been delivered was most successful. The committee beg to express their thanks to Mr. G. Payne for his instructive lecture on chemistry, also to Mr. Roberts, sen., for his interesting displays of dissolving views. The library now consists of nearly 3,000 volumes; a new case has been made for them, and the whole insured against loss by fire. A catalogue has also been prepared. Various classes have been formed, viz., a drawing, vocal, and an elementary class. The two first were successful, but the last was not well attended. A mutual arrangement was made with the Young Man's Christian Association, Wandsworth, for an exchange of a limited number of tickets, which enabled many of the members to enjoy the privilege of hearing a very excellent course of lectures (in addition to their own), of which many availed themselves. The balance-sheet shows that the receipts have been £266 7s. 2d., and that there is a balance in hand of £68 16s. 1d.

ENGLISH MEDICINAL RHUBARB AND HENBANE.

BY RUFUS USHER, ESQ.

Although the introduction of medicinal rhubarb into England is dated by Parkinson as far back as 1629, no real experiments in its culture and preparation for medical use appear to have been made till 1762, when a quantity of seed was sent from Russia, by Dr. Mounsey, from which period till about 1800 it was successfully grown in small quantities by many scientific men, after which it was cultivated at Banbury on an increasing scale, and is now known in the commercial world as a general article of trade; and not only is it consumed in considerable quantities in this country, but it is exported largely to various parts of the civilised world. The origin of the plantations of rhubarb in my possession, and now extending over forty acres, will be best traced by the following extracts from the "Transactions of the Society of Arts." In 1789:—"The Society, in consideration of his merit, and to promote as much as in them lies the growth and cultivation of so valuable a drug, voted their silver medal to Mr. Hayward, as a bounty." In 1794:—"The following accounts and certificates respecting the growth and cure of rhubarb having been received, the gold medal, being the premium offered for cultivating the greatest number of plants, was adjudged to Mr. William Hayward, of Banbury." The following is the testimony of Dr. Pereira:—"In 1789 Dr. Hayward obtained a silver medal, and in 1794 a gold medal, from the Society of Arts, for the cultivation of English rhubarb. Dr. Hayward died in 1811, and the plants were purchased by Mr. P. Usher."

As a proof that even at this early period of its cultivation English rhubarb had obtained the confidence of scientific men, it may be stated that, in 1798, rhubarb of British growth was used at St. Bartholomew's, St. Thomas's, and Guy's Hospitals, and was being experimented on at several others. According to the testimony of Sir Alexander Dick and Dr. Hope, of Edinburgh, in 1784, but little rhubarb was used by the apothecaries of that city but what was produced in Scotland, and it was considered in no respect inferior to Russian. About the same time English rhubarb was put to a severe test at Bath, by Drs. Falconer, Parry, and Fothergill, all of whom attested its merits. Dr. Falconer remarked, that two of the specimens submitted to them answered in external marks to the character of the foreign; that they were rather inferior in delicacy of taste to the Turkey, but superior in other respects to East India. In 1810 Dr. Thornton, then lecturer on botany at Guy's Hospital, referring to the encouragement given to the cultivators by the Society of Arts, makes these remarks:—"This account may serve to show both the ardour of this respectable Society in encouraging the growth of this useful article and the persevering industry of some gentlemen in overcoming all the difficulties attendant on introducing a new plant into cultivation—finding out the means of curing it as an article for extensive sale, and overcoming the prejudices of such as cannot persuade themselves that a drug of British growth can bear competition with what is sent us from foreign countries."

If at a later date the prejudice against English rhubarb having increased, there must have been other causes than those existing in the first introduction of the plant. One cause of the subsequent change in public opinion may have arisen from the partial introduction of new varieties of the plant. From the earliest period in its history there appears to have been a confusedness in the evidence as to its real character; and whether foreign rhubarb is produced from the *Rheum palmatum*, or the *Rheum undulatum*, yet remains an unsettled question. As far as this question relates to rhubarb grown in Great Britain, the stronger probability is, that, after it was imported, several varieties were produced by repeatedly propagating from seed, when a discrepancy was observed, at variance with the earliest descriptions recorded. To show the extent of those changes, I may remark that in the last instance in which I noticed the effect of seedling cultivation, about thirty years since, I found the stalks and leaves more than double the size of those produced from off-sets, a circumstance sufficient to account for the introduction of such varieties as the Victoria and other large sorts now so common in our gardens, and which, when propagated from seed, still keep working change upon change. So convinced have I been for a long time of the injurious tendency of this system, that I have studiously avoided the use of seed altogether; and the plant has so far receded to its original type, that not one has produced ripened seed during the last twenty years. It is a fixed trait in the cultivation of medicinal rhubarb, as it is in most bulbous plants, that if produced from off-sets only, it ceases to produce seed, and if raised from seed each succeeding generation produces seed also, adding variety to variety almost indefinitely. Assuming, as an incontrovertible fact, that the plant has now for such a lengthened period been propagated from off-sets as to be incapable of bearing seed, it will guarantee the conclusion that if, during a number of years, when its cultivation was pursued by a larger number of growers, for the purpose of making experiments, and each one, in haste to enlarge its growth,

resorted to seed propagation, it degenerated from external causes, it is equally logical to infer that, the causes having ceased which led to its deterioration, it has now regained its specific distinctiveness, and is not likely to diverge again into any transition from its central type. It is thus quite possible to account for the previous deterioration of the plant for medical uses, which caused the strong prejudice existing for many years against it, and some remaining doubts are still expressed respecting the real properties of English rhubarb; but that a powerful reaction has taken place in its favour since the plant has been restored to its primitive form of development, there is most ample testimony, not only in the increased demand for it at home and abroad, but in the evidence of eminent medical practitioners. In addition to the improvement which became apparent in the plant by the entire exclusion of seedlings, an important change has been effected in the mode of drying, by exchanging a high artificial temperature for a more gradual one; the process in the first stages being effected by the application of a strong current of atmospheric air, which has not only greatly condensed the root, and rendered it less porous, but has given it an appearance approximating more closely to foreign.

The progressive but certain destruction of all former prejudices existing against the use of English rhubarb, may be adduced from facts much stronger than theory. The first is that as recently as 1845, the extent of land appropriated to the cultivation of the plant did not reach ten acres, whereas now it has reached upwards of forty acres, and even this is quite insufficient to supply the foreign demand for trimmed English rhubarb. If the home consumption of this drug had remained stationary, the export trade alone would have afforded every facility for extending the plantation, a fact most strikingly shown by the article being sent to ports, such as Odessa, from which East India rhubarb is sent to Great Britain.

Even where regulations of the most stringent character have been put in force to prevent the use of either inferior or adulterated drugs, English rhubarb has passed the ordeal in safety. The following is a portion of one of the statutes of the United States of America, entitled, "An Act to prevent the Importation of Adulterated and Spurious Drugs and Medicines." Thirtieth Congress, Chapter 70th, date 1848; Section 1st provides—"That from and after the passage of this Act, all drugs, medicines, medicinal preparations, &c., imported into the United States from abroad, shall, before passing the Customs-house, be examined, as well in reference to their purity and fitness for medical purposes, as to their value and identity specified in the invoice." Section 3rd provides—"That if, on examination, any drugs, medicines, medicinal preparations, whether chemical or otherwise, are found, in the opinion of the examiner, to be so far adulterated, or in any manner deteriorated as to render them inferior in strength and purity to the standard established by the United States, Edinburgh, London, French, and German pharmacopœias and dispensatories, and thereby improper, unsafe, or dangerous to be used for medicinal purposes, a return to that effect shall be made upon the invoice, and the articles so noted shall not pass the Customs-house, unless, on a strictly analytical character called for by the owner or consignee, the return of the examiner shall be found erroneous." To carry into effect the provisions of this Act, qualified examiners of drugs were appointed, at salaries varying from one thousand to sixteen hundred dollars per annum, at the ports of New York, Boston, Philadelphia, Baltimore, Charleston, and New Orleans.

A large proportion of my trimmed rhubarb for several years passed through the hands of Messrs. David Taylor and Sons, for shipment to the American market, where it became a regular article of commerce.

From the year 1855 to the present period the demand for English rhubarb has far exceeded my means of supplying it; and the ratio in which the increasing demand is taking place far exceeds the propagating capacity of the plant. The period when the rapidly increasing demand for export took place, was that immediately succeeding the investigation of the question by a Committee of the House of Commons, during the sessions of 1855 and 1856. It will be recollected that a committee was appointed, of which Mr. W. Scholefield, member for Birmingham, was chairman, to invest the question of adulteration of food, drink, and drugs. During the sitting of this committee a large number of witnesses were examined on the question of English rhubarb, with varying results as to the individual opinion of the parties examined. Some, amongst whom may be named Dr. Hassall, contended it was practicable to carry out a system of absolute purity in drugs and chemicals; whilst others, with equally practical views, contended that a classification as to the quality of these articles must always exist. I need scarcely say that the evidence adduced on the question of the adulteration of drugs, as of other things, was very conflicting and inconclusive. At the commencement of the second session occupied by the committee in this investigation I was summoned, on the 5th March, 1856, to give evidence on the long-vexed question of English rhubarb; but both as regards my own and the evidence of other parties, which fully shows the importance of the question raised, I can do no more in this paper than refer the reader to the Blue Book for an exposition of the whole affair. But to show that my position was not damaged by the result, I quote the following words of the Chairman of the committee at the close of my examination:—"If it be represented to the committee that English rhubarb is sold as an adulterating article, and is of a very inferior quality to foreign, that is a mistake; for medical men attribute very important medicinal qualities to English rhubarb, and it is consumed in some important public establishments, and is held by very high medical testimony to be an exceedingly useful medicine." One of the public establishments referred to here is the London Hospital, where English rhubarb alone had then been used for a number of years. The inquiry carried on before the committee was kept alive, to a great extent, owing to what was represented to be the extreme difference in the money value between foreign and English rhubarb; and it was on this point that I had to complain of some unfairness. One witness stated the difference as great as between 11s. per pound on the one side and 4d. on the other. Here the retail price of foreign was quoted, the average wholesale price of China rhubarb for the 12 months previous being only 5s. 6d., whilst as to quality, the maximum of one was set up against the minimum of the other, as I was, at the very time the evidence was taken, entering English rhubarb for shipment at 2s. per pound to Messrs. Taylor, Brothers, Mark-lane.

A great error, almost invariably committed in passing judgment on any article of supposed inferiority, is to judge it by an improper standard. This has been strictly so in the present instance. To show that one sample is of bad quality, is certainly not proving that another is good; but when an attempt has been made to prejudice the public against the use of English rhubarb, it has sometimes been done by putting it into competition with the very choicest specimens of the foreign article; and I believe that all the comparisons, including the testimonials also, have been made on this principle. If it is true that a great difference exists in samples of drugs generally, it is yet more so in those of foreign rhubarb. It is well known that but a very small proportion of imported rhubarb is of the best quality. This fact did not escape the notice of Dr. Pereira. He remarks, that when China or East India rhubarb arrives in London, it is hand-picked, tared, and sorted into three qualities —bright and sound, dark and horny, and worm-eaten. He adds the following evidence on this point:—"In 1840, when China rhubarb was very scarce, a quantity of foreign rhubarb, imported from Calcutta, was sold, some at 4d. and some at 1d. per pound." As the evidence arising from dissimilarity of price has been used as an

argument to show the inferiority of English to foreign, the following facts deserve notice:—In the years 1846 and 1847, there was a very large quantity of foreign rhubarb disposed of, amounting to several tons weight, and such was its general quality and condition, that the terms made use of to designate it, with the prices realized, were as follows:—Old and bastard, at ½d. to 1½d. per pound.; old brown and rotten, 1d. to 4d.; rotten and damaged, 3d. to 5d.; brown, old, and perished, 1d. to 6d. During these periods large quantities of English were sold at from 1s. to 2s. per pound. Thus it is seen, that if the maximum price of foreign is higher than English, the minimum price of English is higher than foreign. Whatever, therefore, may be supposed to be the relative difference between English rhubarb and the best specimens of foreign, it is clear that, owing to the very imperfect method of curing it in those countries where it is produced, there is invariably that strict uniformity of character in the one which is as invariably wanting in the other.

One leading question relating to this most important medicinal production yet remains to be solved at some future period, namely, whether the plant from which foreign rhubarb is produced is the best that could be selected? Judging from the very great variety and very interesting specimens in the possession of Dr. Hooker, all of them distinctly differing from each other, it would appear doubtful if the foreign cultivators have made such researches and instituted such experiments as would lead to a judicious selection of the best sorts. It is also highly probable that, if offsets could be obtained from a number of the several varieties of the plant produced in Tartary and elsewhere, we might acclimatise some yielding higher medical properties than any yet cultivated in Great Britain; but as the means of obtaining them is entirely out of my power, I can only say, that if I could be assisted in procuring them, I should feel great pleasure in carrying out such a series of experiments as might ultimately render an important addition to the medicinal productions of the nation.

My attention has recently been called to the subject of the preparation of that very important medicine, tincture of henbane, in consequence of the very erroneous views entertained with regard to the character of the plant, and to the somewhat scanty, if not imperfect directions, contained in the new pharmacopœia respecting its preparation for use. It is out of my province altogether, as a grower and preparer only of medicinal plants, to call in question the correctness of the pharmacopœia from any other point of view than that of an omission. The directions given in this work for the preparation of tincture of henbane are, to use "the leaves and branches of the indigenous biennial plant dried, when about two-thirds of the flowers are expanded." Now I believe that almost every wholesale druggist in the kingdom will endorse my statement, when I say that up to the year 1862 but a fractional part of the tincture of henbane prepared in this country was made from the blossoming biennial plant; a circumstance not so much reflecting discredit on those who prepare and supply the article for use, as arising from the absolute impossibility of procuring the material to carry out the instructions of the pharmacopœia. If the question is asked, why the blossoming biennial plant had not, up to that period, been produced in sufficient quantity to supply the demand, I reply that, owing to the almost invariable attack made on the plant during the autumn and winter months by the wireworm, slug, and other destructive visitants, but a small proportion survives till the ensuing spring. Either the root is bitten through in several places or the bud entirely consumed. To this it must be added, that of the plants which escape this ordeal, when they have reached that stage of their development pointed out in the pharmacopœia, namely, "when two-thirds of the flowers are expanded," the quantity of foliage is very scanty, and it will only pay the producer at a high price.

Through some erroneous impression, that has long existed, and still continues to exist, respecting this very important plant, the first year's growth is spoken of as the annual, than which nothing can be more palpably wrong, as the two articles, when prepared for use, vary as essentially in their external appearance as in their constituent properties; applying this simple test only, that the annual plant, when dried, consists both of leaves and blossom, whereas the first year's growth of the biennial must necessarily consist of leaves only. Assuming that, when the second year's growth of the biennial plant cannot be procured, recourse must be had to the first year's growth as a substitute, the pharmacopœia should have made known the comparative strength of the latter. No objection could have been made to such directions, when it could be shown that a second-class article must of necessity supplant a superior one, as occurs, doubtless, not only in this but in many other medicinal preparations. If, in the use of the two separate articles now under consideration, the same instructions are carried out, namely, to use two ounces and a half of the dried plant for a pint of tincture, and one should prove to possess two or three times the strength of the other, it assumes a serious aspect in the administration of so very important a medicine. We require a new definition altogether of the plant when dried for use. Instead of making two divisions only, as at present, annual and biennial, it should be classified as follows:—

Biennial henbane of second year's growth.
Biennial henbane of first year's growth.
British annual henbane.
German henbane.

This would at once simplify the question, and prevent those erroneous views which have very widely prevailed amongst all parties concerned in its preparation and use. It will be seen that I have arranged the above classes in the order of their value. The two last-mentioned—the British annual and the German—although most extensively used, are so thoroughly undeserving notice, that they require mention only to guard the public against their use altogether. Of these two, the British annual is perhaps preferable to the foreign, and its appearance, unfortunately, approximates sufficiently close to the second year's growth of the biennial plant to enable the vendor to pass it as such; but if no other criterion existed than that it possesses no flavour, or aroma, that would be sufficient to detect the imposture. Independently of this test, the leaves will be found much shorter; and occasionally will be seen a pure primrose blossom, which never occurs in the beautifully streaked blossom of the biennial; but the very fact of the appearance of blossom in the sample, that blossom being generally so much like the blossom of the biennial, leads to the very erroneous conclusion that it is the same plant.

Owing to the extreme price which the dried biennial plant of the second year's growth has realised in former years, the consumers have not given that encouragement to its production which its intrinsic value merits. The great difficulty, however, which has thus been felt till very recently—that of not being able to obtain a supply except at a most exorbitant price—is now to a great extent obviated. From a long, careful, and continuous study of the cultivation of biennial henbane, I have at length so far succeeded in preserving it from the attacks of insects, to which it is ordinarily subject, and have to such an extent economised the system of drying the plant, as now to bring the price within reasonable bounds, and to leave those who prepare the tincture of this valuable plant without any just excuse for using an inferior article.

This is not an age in which scientific research can be long baffled in its inquiries; and as the articles in ques-

tion will be placed before the public in the Paris Exhibition of 1867 (class 44), no more will be anticipated from their inspection by a competent tribunal than the closest scrutiny will justify.

Fine Arts.

NATIONAL PORTRAIT EXHIBITION.—The exhibition of last year is officially declared to have been "very successful." "During the 18 weeks it was open it was attended by 73,000 visitors." In order to record the general appearance of the galleries, and the position in which the pictures were hung, 77 photographic views have been taken and published of the bays of the exhibition. And, for the purpose of affording to artists and others examples of court costume, nine photographs, on a large scale, have been executed from the most important portraits of the Tudor period.

PHOTOGRAPHS TAKEN FOR THE DEPARTMENT OF SCIENCE AND ART.—The arrangement, of which we have already given notice, for the sale of these photographs by the Arundel Society, is now complete, and a classified list has been published. The catalogue comprises photographs from national portraits and miniatures, cartoons and drawings by Raphael and Michael Angelo, Holbein drawings at Windsor, works by Mulready, "Liber Studiorum," by Turner, Italian sculpture, &c.; also objects of decorative art in precious metals, porcelain, crystal, enamel, ivory, &c., belonging to, or placed on loan at, the Kensington Museum. The entire series comprises upwards of two thousand photographs. It is also announced that "Artists, manufacturers, and the public generally, may obtain negatives from the objects in the permanent collections in the Art Museum," at a rate of charge ranging from 10s. to £1 10s. Negatives are also taken of all works on loan, and two prints presented to the proprietor. Photographs which may be deemed calculated to promote art education, are circulated among the schools of the kingdom. The general intention of the above arrangement is to promote the knowledge of art throughout the country. Full information can be obtained either at South Kensington Museum or at the offices of the Arundel Society, in Old Bond-street.

Commerce.

THE NUTMEG.—For many years the Straits settlements were famed for the cultivation of the nutmeg. At Penang, in Province Wellesley, at Malacca, and at Singapore, the cultivation of this spice seemed to be attended with very gratifying success. Young trees were set out in every direction in plantations, and everywhere they appeared to thrive, and to yield a very fair supply of nutmegs. The nutmeg tree has a pretty appearance, running up to a height of from 25 to 30 feet, with numerous branches shooting directly out at right angles from the stem, and the leaves are of a fine green colour at the top, and of a paler hue on the under surface. Strange as it may seem (says the *Produce Markets Review*) the cultivation of this spice tree has apparently declined. In fact, of late years, it has become a losing business. Everywhere through the Straits it is now pronounced a failure. As a substitute for this branch of industry, the planters are setting out their lands with cocoa-nuts. Whether the substitution of the cocoa-nut cultivation for the nutmeg will prove an equally valuable product is yet undetermined. Of course there are other places where the nutmeg will be still grown. It is said to be indigenous to the Molucca Islands, and to parts of Java. It grows to some extent in Ceylon, almost by the side of the cinnamon and coffee trees. It has been introduced into the Mauritius, and into some of the West India Islands. However much the loss of the spice trade may be regretted by friends of the Straits, the markets of Europe and of the East will never fail, of course, of receiving their supplies from other places.

Obituary.

MR. JOHN BETHELL, the patentee of the creosoting process for preserving timber, died in London, in the early part of the present month, at the age of 64. He was the only brother of Lord Westbury. *Engineering* states that Mr. Bethell took his idea of preserving wood by creosote from the embalming of mummies, the creosote having the property of coagulating albumen. Coal tar contains a considerable quantity of creosote, and when boiled to expel its ammonia it is called coal oil. The proportion of creosote in this oil is ascertained by mixing it with 10 per cent. of its own bulk of a strong caustic alkaline solution. After shaking and settling, three layers will be formed—the lower layer of caustic alkali, the next, forming from 8 to 18 per cent. of the whole, being creosote, while the bituminous oils float at the top. Mr. Bethell joined the Institution of Civil Engineers as an Associate, March 20th, 1838, but did not become a member. His creosoting patent was dated July 11th, 1838. He took out several patents, including ploughing engines, steatite bearings for carriages, and improvements in agriculture. He was at the time of his death chairman of the British and Foreign Railway Plant Company. He was elected a Member of the Society of Arts in 1853, and not unfrequently spoke at its meetings.

Publications Issued.

SUCCESSFUL OYSTER CULTURE. By Harry Lobb, Esq., (*Ridgway, Piccadilly.*) Price 1s. This pamphlet gives an account of the success obtained at the Ile de Ré, Arcachon, and at Hayling Island, near Portsmouth, by the modern system of oyster culture; with extracts from the *Times*, the *Field*, and other papers. The system carried on at Hayling appears to promise great results, and should be witnessed by all desirous of entering upon this new field of industry.

Notes.

SOUTHERN COUNTIES ASSOCIATION.—A meeting of the Council was recently held at the house of the Society of Arts; present—Viscount Eversley, in the chair; Hon. and Rev. S. Best, Mr. Beynon, M.P., Mr. Clutton, Lieut.-Col. Deedes, Lieut.-Col. Lennard, Mr. Lyall, Sir H. St. John Mildmay, Bart., Mr. Melville Portal, Mr. J. C. Ramsden, Mr. Rigden, Mr. R. J. Spiers, Rev. T. C. Wilks, Mr. Wise; Rev. James Beck and Mr. Shute, secretaries. A considerable number of members were admitted, among whom may be mentioned, Major Aldridge, Knepp Castle, Horsham; Captain B. B. Barttelot, Findon-place, Worthing; Mr. Thomas Bell, the Wakes, Selborne, Hants; Mr. George Blaker, Pilcomb, Hurstpierpoint; Mr. J. Bonham Carter, M.P., Adhurst St. Mary, Petersfield; Rev. G. A. Clarkson, Amberley Vicarage, Arundel; Mr. E. W. Cooke, R.A.; Mr. W. H. Dunn, Inglewood-house, Hungerford; Mr. I. P. Fearon, Ockenden-house, Cuckfield; Mr. A. J. Beresford Hope, M.P., Bedgebury-park, Goudhurst; the Bishop of Oxford; Rev. F. Parsons, Selborne, Hants; Mr. Wm. Saxby, Rottingdean, Brighton; Rev. E. St. John, Finchampstead, Wokingham; Mr. F. Tupper, West Ham, Hurst-green; Mr. Wm. Webb Turner, Chyngton, Seaford, &c. The proposed plan of the show-yard at Hove, and estimate for the supply and erection of shedding and offices, were submitted to the Council by

Mr. Henry Manning, late contractor to the Royal Agricultural Society, and the secretary was authorised to sign a preliminary contract with him for the amount of £587, capable of extension after the 1st of May, should the number of entries render it requisite. In reference to the exhibition of works of art in the Pavilion being kept open by the mayor and corporation of Brighton for a month after the closing of the show of the association, the secretary was directed to inform the mayor that the only guarantee they would require from the corporation for the safe custody of the property handed over to them was what they themselves give to the lenders—viz., that of extreme vigilance. The following stewards of the Brighton Show were then chosen:—Stock: Sir Archibald K. Macdonald, Bart., Mr. George Shackel, Mr. James Singer Turner, and Mr. Richard Woodman. Horses: the Earl of Portsmouth and Mr. T. Pain. Implements: Lieut.-Colonel Deedes and Mr. P. S. Punnett. Poultry: Mr. H. F. Stocker and Mr. Turner. Mr. George Darby, of Marklye, Warbleton, was unanimously elected a vice-president for Sussex, in the room of Sir J. Villiers Shelley, Bart., deceased. The Council adjourned to Wednesday, April 10.

Correspondence.

THE GOVERNMENT AND THE TELEGRAPH.

SIR,—I regret that some pressing engagements have delayed my answer to the question put to me by letter, in the *Journal*, by Mr. Hawkins Simpson, *i.e.*, whether I think that, either at the present time or in future years, it would be for the public interest to prevent the despatch of telegrams by private enterprise; or, in other words, do I "wish the Government to monopolise the use of electricity for the purpose of conveying information to the public." I conceive that, on a due consideration of the tenor of my paper, it might be perceived that my chief wish is that the Government should make free to us, the public, the full use of our own establishments—should make free to us the means of communication which science has given us—and should free us from exactions on our necessities by irresponsible traders, who, under the guise of competition, have obtained joint and sometimes separate monopolies of the necessarily imperfect and necessarily dear use of those means. I believe that the conveyance of telegraphic messages, as well as the conveyance of letters by post, may and ought to be so conducted, as a responsible public service, as to leave no chance for private trading competition, and no need of any penalties for protection against it.

There are now penalties on our statute books against the sending or conveying any letters by post, but they appear to have fallen into disuetude. Nevertheless, we know that on occasions of emergency persons do send letters, tied up as parcels, by railway or by coach, to insure a special delivery earlier than is provided by post, and I think that—except, perhaps, for ocean transit, for which heavily subsidised mail packets are provided—all persons should be left free to do so, the occasions for using the privilege being comparatively few, and the necessary extra charge being itself a sufficient protection against any evasion of moment against the revenue. Moreover, the entire freedom of conveyance should serve as a stimulus to the public servants, so to improve their deliveries at all points for payments as for a service, as to leave private speculators no chance of doing anything the like for any profit over and above the actual cost of the service. I therefore consider that penalties are a remnant of conditions of protectionism, from which, as engendering stagnancy and slowness, the postal service should be purified. And so with telegraphic communication. Private individuals, manufacturers, traders, and gentlemen should be left free to carry telegraphic wires over their own lands or premises, or over others where they can obtain way-leaves, and they should be allowed, on payment of a fair rent, to have separate wires carried over the public bearers, or to have connections with the public postal stations (on the like terms as private letter boxes) as they may find to their advantage.

Amongst other communications I have received in support of the views set forth in my paper, is one from which I cite the following common illustration of the important benefits derivable throughout the country from the proper application of the principle of administrative consolidation to the matter in question:—

"Between here and London we have to traverse two telegraph companies' lines, and of course any fault is always attributed at this end to the main company. The agent here is a house agent, and the telegraph is useless to any one telegraphing a private message about a house to be let or sold. At the last election one party had to send their messages five miles by a messenger to forward them by telegraph, thus diminishing considerably the number of messages sent. In many small places, as it is here, the post office is in a shop, but if the telegraph was added to the post office, there would be sufficient employment for a postmaster without the shop, or he might be made the collector of taxes also, and do that during the less busy hours of the day—that is in the middle of the day,—usually the best time for collecting taxes. If, then, these offices were united, and given to one competent man, the work would be done much better than it is at present, when the three offices are given to three incompetent men. The officer might be made also the assessor of property for the house and property tax, and, being a government officer, he would have no motive for divulging any of the facts, but rival tradesmen have a keen motive to do so."

I should have mentioned the frequent need of the transmission of messages over the lines of separate companies; and their repetition by different clerks as a common source of mistakes; and the conveyance of the messages by hand from one company to another as a necessary occasion of delay, as well as of extra cost.

I consider the utilisation of our 10,000 postal establishments, and of the services of our 20,000 letter-carriers and postal servants for the transmission of money-orders (which I might have mentioned as one service that might often be rendered by postal telegraph), and for the collection, care, and payment of savings, as well as for the payment of annuities, to be one of the most valuable public improvements of our time. But I must take occasion to declare that greatly as our postal service has been improved, there is yet much to do with it in the application of correct principles to keep it up with the advances made upon its own great lead in uniform penny letters in various continental States. Not only in Switzerland, but in other States, a halfpenny letter post has proved to be remunerative. In Hanover, and I believe in some other States, there is a farthing post. In Belgium our *Journal*, for which we are charged a penny, would be delivered for a halfpenny, and so with newspapers and any sheet of printed matter. The charge for the carriage of books is double what it ought to be With charges reduced (according to the principles we have contended for in this Society) parcels in Hanover are frequently as numerous as letters. In Switzerland, by the adoption of the same principles, the postal parcels have largely advanced; and by these cheap postal deliveries, which separate traders could not accomplish, the railways gain, as we said they would do, by an amount of goods traffic in bulk which otherwise they would not have. Our postal regulations for the conveyance of trade samples, at a fourfold rate of eightpence per lb., are made in a dark spirit of protectionism against parcels in general, and on a principle of exactions on necessities from which the whole service ought to be purged.

Without presenting it as the most advanced example, I adduce the following account, sent me by a relation resident at Zurich, of the present postal system,

including telegraphs and parcels, to which Switzerland owes so much of its late commercial and social progress. This account I would commend to the special attention of chambers of commerce, as a most important subject for their consideration, and to retail dealers in the country, as well as to wholesale houses in towns.—I am, &c., EDWIN CHADWICK.

"The largest sized parcel that can be sent by our post is 120 pounds.

"Books, if above 500 grammes (1 lb. 4 oz.) pay as parcels, according to weight or value.

"Parcels (of weight and value) are taxed in Switzerland according to the distance they have to run (the shortest post road being measured). We distinguish weight and value parcels.

"Weight parcels, up to 10 lbs., pay for every 15 English miles 2 centimes, or rather less than a farthing for every pound weight (an English shilling = 125 centimes); and to this is added a ground-tax of 10 centimes (one penny). For weight parcels above 10 lbs. the first 10 are charged as above stated, and 1 centime is added for every additional pound and distance (a distance is equal to 15 English miles).

"Value parcels up to 1,000 francs (£40) pay for every 15 miles (or 1 distance), and every 100 francs 2 centimes (less than a farthing), and to this is also added a ground tax of 10 centimes (one penny). Value parcels above 1,000 francs (£40) pay as above for the first £40, and then are added 1 centime, or half a farthing for every 100 francs (or £4) and distance (15 miles).

"The minimum of a weight or value parcel is, up to 15 miles, 1½d. (15 centimes); above 15 and up to 30 miles, 2d. (20 centimes); above 30 and up to 75 miles, 3d. (30 centimes); above 75 up to 120 miles, 4½d. (45 centimes); above 120 miles, and up to the greatest possible distance in Switzerland, 6d. (60 centimes).

"Value parcels are taxed generally according to their value, but if their weight gives a higher rate than their value, they are rated by weight.

"A parcel weighing between 1 lb. and 2 lbs., with a value of 200 francs (£8), would cost, from Zurich to Geneva, 6d. The post is answerable for the value of the parcel, which has determined the rate of postage.

"Newspapers and printed matters pay, throughout Switzerland, up to 15 grammes (not quite three-quarters of an ounce), 2 cents. (not quite a farthing); from ¾ oz. to 10 ozs., 5 cents, ½d.; from 10 ozs. to 20 ozs., 10 cents, 1d. These parcels, if above 20 ozs., pay as weight parcels.

"Letters (local rate) pay, up to six English miles, for 10 grammes (not quite half-an-ounce), ½d.; from not quite half-an-ounce to 10 ozs., 1d.

"Letters throughout Switzerland, not quite half an ounce, might pay 1d. if prepaid, 1½d. if not prepaid; from half-an-ounce to 10 ozs., 2d. if prepaid, 3d. if not prepaid.

"Our postage is cheaper and more extended than in the neighbouring countries. Our telegraph costs a franc throughout Switzerland for every twenty words; five words more cost 2½d. Baden, Wirtemberg, Bavaria, have the same telegraph tax, but their wires are not nearly so numerous as ours. I am told that Switzerland has many more telegraph lines and offices than any other country; in fact, we can telegraph to every village, and to the tops of all mountains where any hotels are. Telegraphs are so good and so cheap that everybody uses them—rich and poor—consequently they pay very well. We are now introducing telegraph stamps."

Mr. Rumbold, in his report to the Foreign Office on the Federal finances and expenditure, states that the interests of Switzerland at large have been "admirably served" by the transfer of the Continental post to the central authority under the existing system; the effects of the new postal system exceeded every expectation:—"The gross receipts of this branch of the public adminstration, which in 1849 only reached the sum of 4,898,327 francs, had increased in 1861 to 7,112,951 francs, and are reckoned in the budget for this year (1866) at 8,607,500 francs. According to the report of the Federal postal department for 1864 (the report for 1865 has not yet been published), the net receipts amounted to 1,503,302 francs 50 centimes, as against 758,212 francs in 1850. The number of letters increased in the same period from 15,106,117 to 34,325,916; the parcels sent by post from 2,099,368 to 4.813,264; the newspapers sent by post, from 10,601,325 to 25,026,095. I may mention here that the number of newspapers sent in 1864 exceeds, by no less than 1,562,625, that of the newspapers sent in 1863."

MEETINGS FOR THE ENSUING WEEK.

MON.....Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
London Inst., 7. Mr. G. A. Macfarren, "On the Lyrical Drama."
R. Geographical, 8½. "Last Journey of Dr. Livingstone." Despatches from Dr. G. E. Seward and Dr. J. Kirk.
British Architects, 8.
Actuaries, 7. Mr. Peter Gray, "On the Construction of Tables by the Method of Differences." Part III.

TUES ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion "On Steep Gradients and Sharp Curves;" and (time permitting) Mr. W. A. Brooks, "Memoir on the River Tyne."
Ethnological, 8. 1. Professors Huxley and Busk, "On the Skulls of the Ainos, Chinese, Hottentots, Kaffers, and Burmese." 2. Mr. J. Crawfurd, "On the supposed Aborigines of India as distinguished from the Civilised Inhabitants." 3. Dr. Hyde Clarke, "On Ancient European Mines."
Royal Inst., 3. Rev. G. Henslow, "On the Practical Study of Botany."

WED ...Society of Arts, 8. Mr. C. F. T. Young, "On Flax, and Improved Machinery for its preparation."
R Society of Literature, 8½.
Archæological Assoc., 8½.

THUR ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
Philosophical Club, 6.
Mathematical, 8.
Royal Inst., 3. Mr. W. Pengelly, "On Geological Evidences in Devonshire of the Antiquity of Man."

FRI .....Royal Inst., 8. Prof. Frankland, "On the Water Supply of the Metropolis."

SAT .....Chemical, 8. Annual Meeting.
Royal Inst., 3. Mr. W. Pengelly, "On Geological Evidences in Devonshire of the Antiquity of Man."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 13th March, 1867.

96. Landed Estates Court (Ireland)—Returns.
104. Bunhill-fields Burial Ground—Letter.
Public Petitions—Eighth Report.

Delivered on 14th March, 1867.

67. Bills—Criminal Lunatics (as amended).
70. ,, Sale of Land by Auction.
34. Metropolitan Board of Works—Report.
46. Trade and Navigation Accounts (corrected pages).
78. (III.) Committee of Selection—Fourth Report.
107. Education—Returns.
109. Army (Engineer Officers)—Return.
113. Army—Estimate "On Account."
114. Civil Services—Estimate "On Account."

Delivered on 15th March, 1867.

21. Railway Companies' Deposits—Returns.
27. Works and Public Buildings—Abstract Accounts.
116. Revenue, Taxation, &c.—Return.
119. Male Occupiers (Boroughs)—Return.
120. Inhabited Houses (Voters)—Returns.
Mexico—Convention.
The "Tornado"—Correspondence (Part II.).

Delivered on 16th March, 1867.

72. Bill—Inclosure.
73. (II.) Railway and Canal Bills—Third Report.
105. East India (Irrigation)—Despatches.
106. Court of Chancery—Return.
121. Parliamentary Boroughs—Return.
127. Captain J. Gordon Deslandes—Papers.
Servia—Correspondence.
Public Petitions—Ninth Report.

Delivered on 18th March, 1867.

46. (1). Trade and Navigation Accounts (31st January, 1867).
125. Merchant Seamen's Accommodation—Return.
Totnes Borough Election—Report of Commissioners.
Children's Employment Commission (1862)—Sixth Report of Commissioners.

Delivered on 19th March, 1867.

77. Bills—Masters and Workmen (Lords).
78. ,, Public Schools (Lords).
79. ,, Representation of the People.
115. Postal Service (Atlantic)—Correspondence.
117. East India (Contract Law)—Return.
131. Treasury Chest—Account.
Cape Spartel Lighthouse—Convention.

Delivered on 20th March, 1867.

18. Metropolitan Workhouses—Return.
118. Gas (Metropolis)—Correspondence.
128. Public House Closing Act (1864)—Return.
134. Greenwich Hospital Estates—Regulations.
135. Metropolitan Local Government, &c.—Reports.
Public Petitions—Tenth Report.

Patents.

From Commissioners of Patents' Journal, March 15th.

GRANTS OF PROVISIONAL PROTECTION.

Alphabets and reading, teaching—476—B. Mitford.
Answers to selected questions, instruments for giving—435—J. Parkes.
Axle-shafts and axle-boxes—582—J. G. Stidder and R. Morris.
Beacons 312—Earl of Caithness.
Boot and shoe toe-pieces—416—D. Tenniswood.
Bottle-stopper and key, a self-closing—382—P. D. Collins.
Breech-loading fire-arms and ordnance—468—J. Bishop.
Brushes—508—C. Turner.
Buildings, floors and roofs of—452—H. Y. D. Scott.
Buttons—384—R. T. Thompson.
Candlesticks—521—H. R. Du Pré.
Carbonate of soda and of potash—494—C. Kessler.
Carding engines—390—J. B. Booth.
Carding engines, feeding—428—J. Ferrabee.
Cartridges, central fire—519—J. Syme.
Casks, cleansing—496—T. King.
Chain beaming apparatus—420—J. P. Kerr and W. McGee.
Chairs—501—C. G. Gumpel.
Chimnies, preventing down draught in—444—C. Wenner.
Cricket spikes—490—J. Wareing.
Dining-tables—434—H. Cooper.
Engines, &c., transferring—386—J. Ramsbottom.
Envelopes—524—E. Hely.
Envelopes, &c., securing—491—C. M. Tate.
Fats, &c., boiling—515—W. Barratt.
Fibrous materials, preparing—529—J. Tatham.
Fibrous materials, scutching, &c.—450—E. Brasier.
Fibrous substances, drawing—426—J. Combe.
Fire-arms—326—J. Box.
Fire-arms, breech-loading—392—J. H. Johnson.
Fire-arms, breech-loading—460—A. Albini and F. A. Braendlin.
Fire-arms, breech-loading—480—J. F. Bland.
Fire-arms, breech-loading—504—I. M. Milbank.
Fire-escapes, portable—572—R. A. Jones and J. C. Hedges.
Fire-places—590—E. Thring.
Foot-rot in sheep, curing—564—M. Woolrich.
Friction matches, packing—414—J. V. Toepken.
Furnaces—354—H. E. Falk.
Furnaces—517—J. A. and J. Hopkinson, jun.
Furnaces—578—B. Sheard.
Gas engines—409—A. Kinder and W. B. Kinsey.
Hammers—440—R. Thwaites, E. H. Carbutt, and J. Sturgeon.
Hard materials, breaking—456 T Archer, jun.
Iron safes—400—J. Westwood and R. Baillie.
Lamps—404—H. Houfe.
Lamps—406—W. Jones.
Lamps—525—G. Young.
Lasts—526—J. L. Sharman.
Liquids, drawing off—424—P. Duchamp.
Liquids, extracting—531—C. E. Brooman.
Meat, preserving—378—E. Gorges.
Metallic alloys—505—P. A. Muntz.
Metal plates, punching—438—R. Hodson.
Meters—109—J. Colvill.
Motive engines, regulators for—580—F. A. P. Vandeputte.
Motive power—472—E. G. Brewer.
Motive power—486—C. Colwell.
Motive-power engines—422—R. Shaw.
Motive-power engines—474—J. Weems and T. Robertson.
Motive-power engines—498—H. Purnell.
Mowing and reaping—588—G. M. Garrard.
Oxygen, producing—568—W. Clark.
Patent leather, &c.—446—A. A. Fousset.
Peat, treating—512—E. Chapron.
Pen-boxes, &c.—374—F. Leonardt.
Phosphatic minerals, preparing—47—W. Way.
Photographic pictures—20—W. G. Helsby.
Pictures, exhibiting—380—A. G. Grant.
Portfolios, &c.—510—G. Lüttringhaus.
Pump-rods, counterbalancing—485—W. West and J. Darlington.
Rag engines—482—J. R. Crompton.
Railways, an alarum for the use of—523—E. Funnell.
Railways, rails for—506—B. Billingham, A. Griffiths, and J. Dudley.
Railways, signalling on—518—G. Daws.
Railway trains, electric signals on—488—A. I. L. Gordon.
Salts of ammonia—358—W. S. Losh.
Saw frames—478—J. Robinson and J. Smith.
Sewing machines—396—A. V. Newton.
Ships, removing sea-weed, &c., from—484—J. Harrison.
Smooth surfaces, polishing—462—R. Kunstmann.
Soap—492—W. Clark.
Spinning, &c., steel caps—500—W. Deakin and J. B. Johnson.
Stays, &c.—408—S. Osborne.
Stays, &c., a new fabric for—592—A. C. Laurys.
Steam boilers—276—W. and D. Fisken.
Steam boilers—376—R. James.
Steam boilers—516—J. Alison.
Steam boilers, &c., fluid safety guages for—511—J. Marshall.
Steam engines—527—C. Martin.
Steam engines, condensing—586—J. Wild, jun.
Steam engines, regulating—448—A. Beniest.
Steam generators—402—W. E. Gedge.
Steam toys—2901—C. Sutton.
Substances, grinding—566—J. Bellerby, jun.
Tallow cups—507—J. Bates.
Tentering machines—398—W. Clissold.
Textile fabrics, &c., sewing—574—J. H. Johnson.
Threads, preparing—509—C. E. Brooman.
Ticket-holders—412—H. A. Dufrené.
Trap doors, &c., securing—436—E. Stevens.
Vehicles—388—W. Stratford.
Vehicles, wheels for—470—G. Haseltine.
Veneers, cutting—570—A. V. Newton.
Vessels, raising—441—A. Dillon.
Weaving, looms for—430—E. Lord.
Windlasses—442—W. H. Harfield.
Windows, &c., securing—432—J. Carter.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Bath belts—699—M. J. E. Jullienne.
Leather, hardening, &c.—651—W. H. Towers.
Needle cases—669—J. E. Asselin.
Pianofortes—623—W. E. Gedge.
Scissors or shears—649—B. Snow, jun.
Solutions, preserving—684—H. A. Bonneville.
Steam boilers, feed-water regulators for—614—G. Haseltine.
Steam engines, &c., packing for—613—G. Haseltine.

PATENTS SEALED.

2385. J. Dodge.
2386. J. H. Johnson.
2395. T. Parkes.
2397. J. H. Sams.
2399. A. S. Stocker.
2401. F. Sage.
2408. T. Dixon.
2410. G. and E. Ashworth.
2415. A. B. Bérard.
2424. G. Stuart.
2458. H. Turner.
2480. H. A. Bonneville.
2481. H. A. Bonneville.
2482. H. A. Bonneville.
2483. H. A. Bonneville.
2497. H. E. Gilles.
2499. T. W. Bunning.
2517. H. A. Bonneville.
2593. G. T. Bousfield.
2726. A. V. Newton.
2903. A. V. Newton.
2916. C. D. Norton.
2980. H. A. Bonneville.
3183. T. Wilson.
30. E. N. Gregory.

From Commissioners of Patents' Journal, March 19th.

PATENTS SEALED.

2413. C. W. Siemens.
2419. G. O. Gooday.
2433. G. Dyson.
2434. J. M. Heppel.
2437. G. Thring.
2439. J. G. C. Fussell and W. Wise, jun.
2441. T. Brace and W. Savory.
2446. W. Weichert.
2450. A. F. Stoddard.
2462. J. Lawson and E. G. Fitton.
2485. J. H. Johnson.
2501. J. A. Chaufourier.
2507. W. Ryan and W. Edgar.
2508. J. S. Johnstone.
2514. W. Clark.
2533. J. Oetzmann.
2591. W. E. Newton.
2705. E. W. Uren.
2767. G. F. L. Meakin.
2780. G. Davies.
3260. J. Varley.
3338. M. H. Simpson.
3452. G. T. Bousfield.
63. A. V. Newton.
93. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

634. J. Platt and W. Richardson.
731. A. Morel.
642. H. Eastwood & B. Matthews.
677. J. Dauglish.
644. S. Holmes.
652. T. Chamberlain.
717. J. McMorran.
662. J. Rowell.
664. B. Day.
685. J. Bleasdale.
690. L. A. Durrieu.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

527. T. Silver and J. Hamilton.
680. I. Horton and I. Kendrick.
707. E. & W. Cope, & W. G. Ward.
719. J. H. Heal.
778. J. A. Maxwell.
699. W. Weild.
702. W. Wood.